



Smart Power Conditioning Technology

——Lithium-ion ESS Application & System Solution

SUNGROW-SAMSUNG SDI ENERGY STORAGE
POWER SUPPLY CO., LTD.

Contents

- 01 SUNGROW-SAMSUNG SDI
- 02 System Solution
- 03 Products & Service
- 04 Case Reference

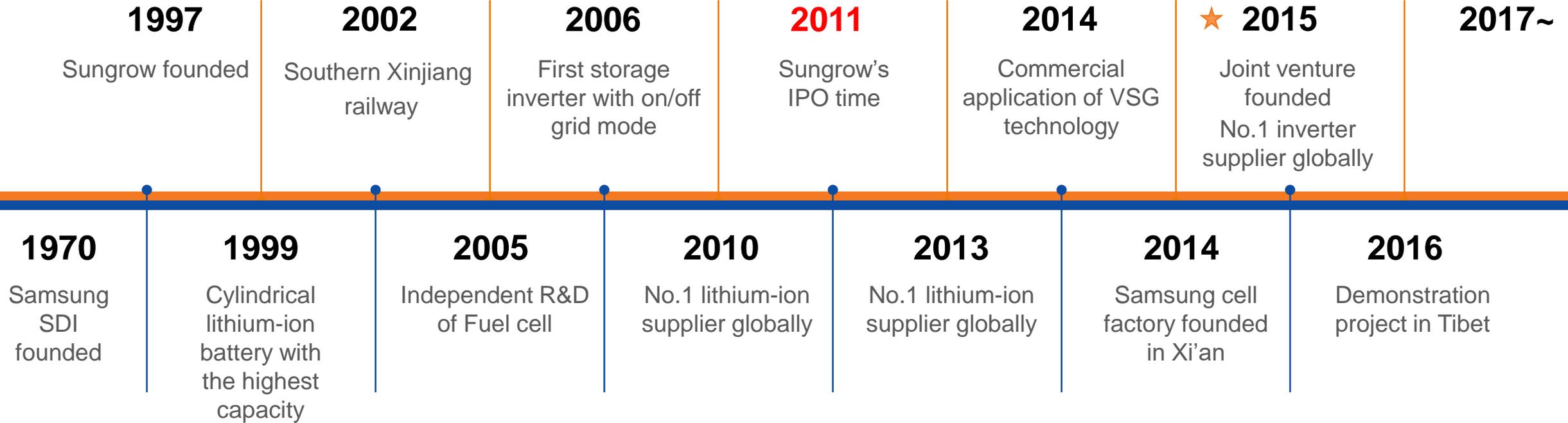


01

SUNGROW-
SAMSUNG SDI

Sungrow-Samsung SDI / Milestones

SUNGROW



Sungrow-Samsung SDI / Mission, goal and value

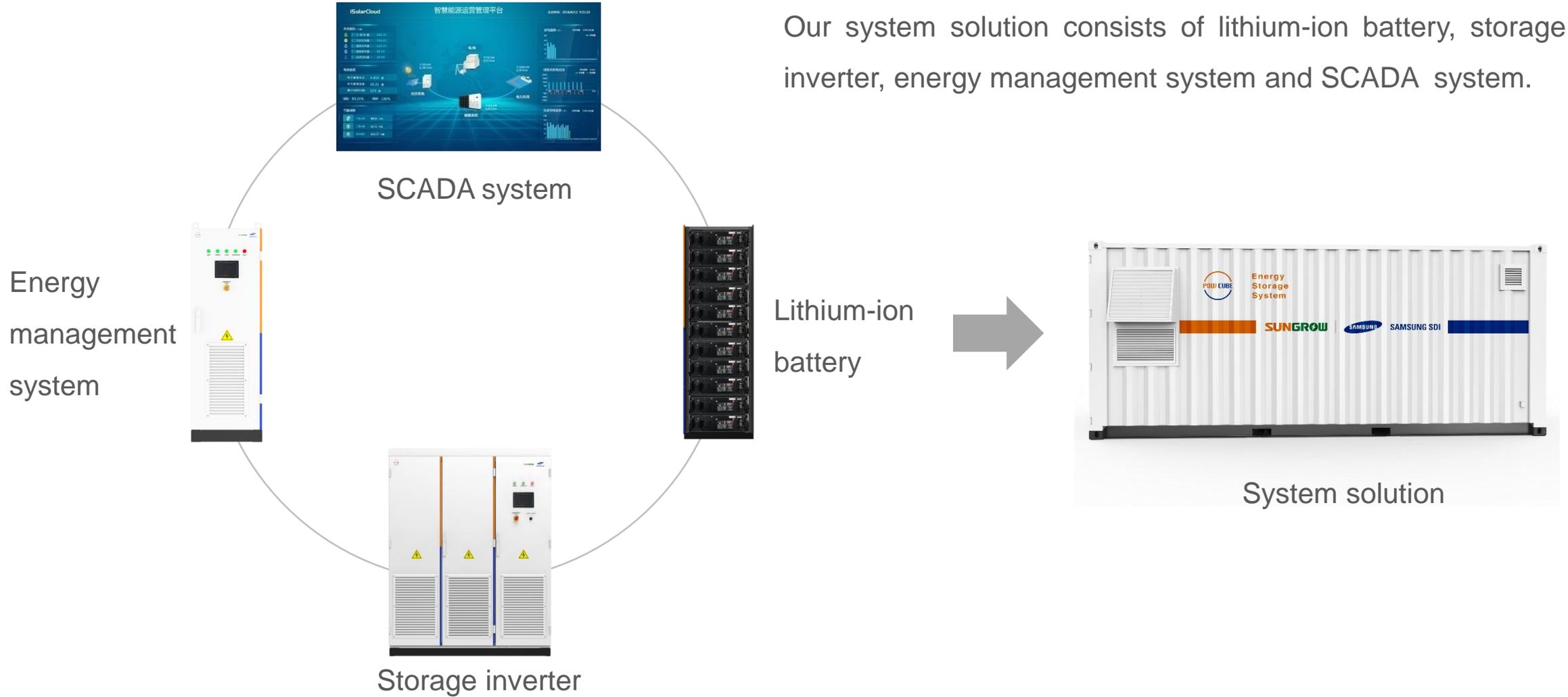
Mission Clean power for all

Goal To be the global leader of power conversion technology

Value Sincere & Pragmatic, Precise & Open, Customer Oriented



Sungrow-Samsung SDI / Business scope



Our system solution consists of lithium-ion battery, storage inverter, energy management system and SCADA system.

Sungrow-Samsung SDI / Production capacity



5GWh Lithium-ion Battery



8GW Power Converter

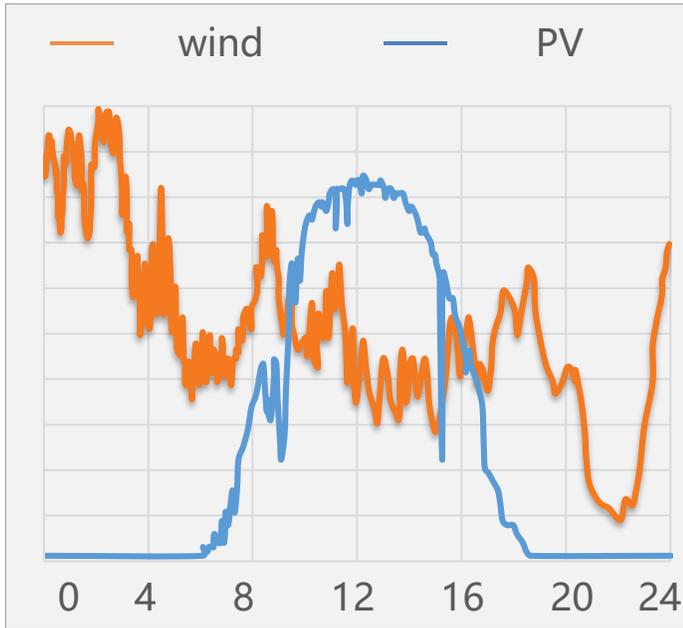


6GW/6GWh ESS Integration

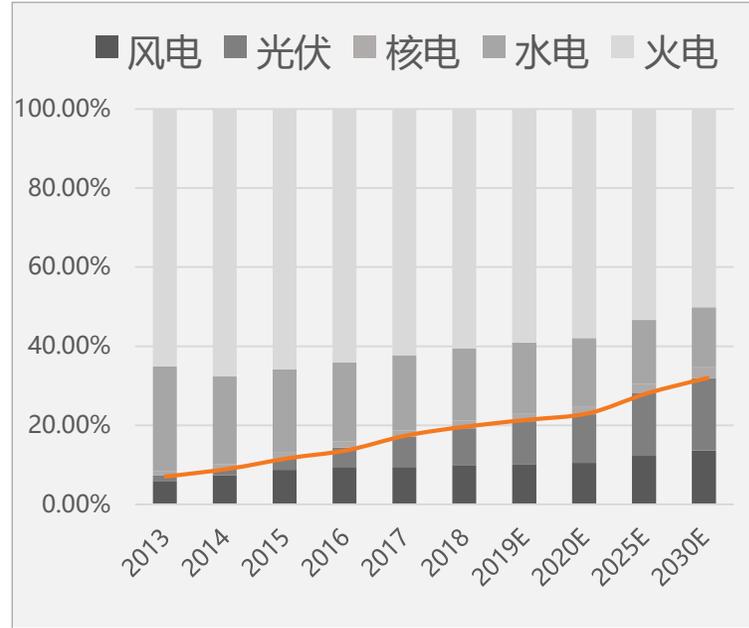
02

System Solution

Challenges of the RE



Power generation side: new energy randomness, volatility and intermittent;



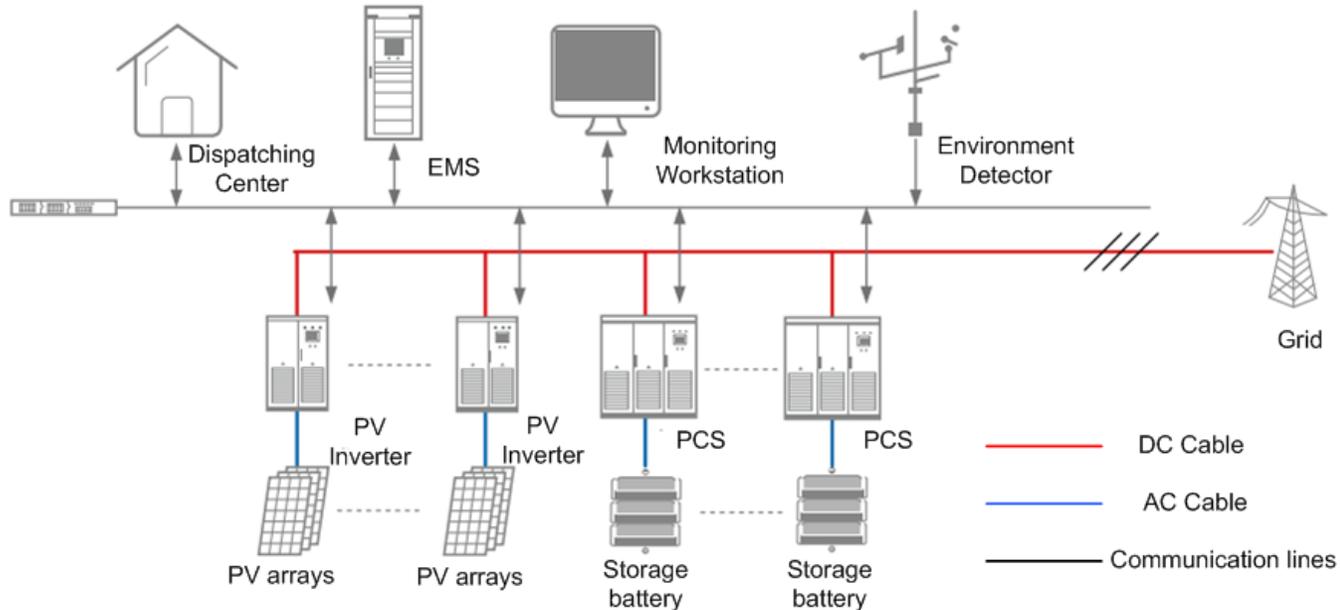
Grid side: The change of power energy structure and power load, resulting in grid instability and short-term capacity shortage. The problem of power facilities is being required to be upgraded .



User side: load peak and valley difference continues to rise and the wrong peak mode of electricity is not widely used, resulting in the power supply pressure of the power grid, the user's high electricity bill



AC Bus Solution



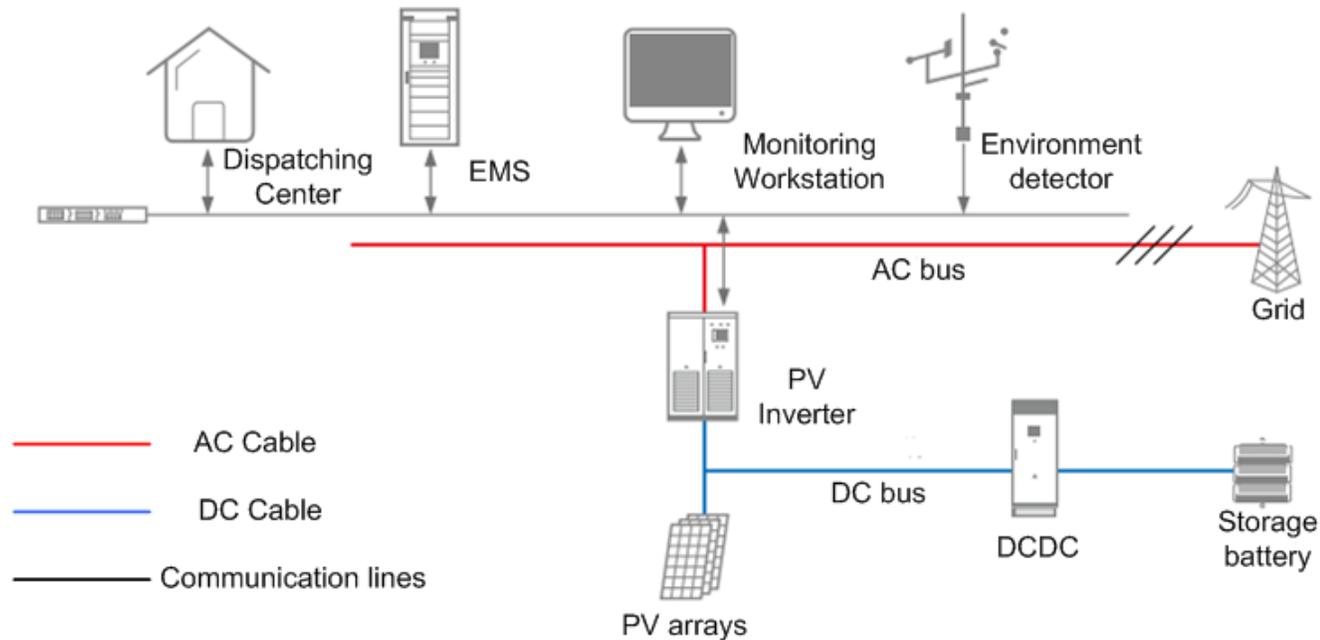
Applications

- Large-scale solar power plant
- Peak shifting in industrial/commercial
- Centralized charge and discharge

Features

- AC bus, centralized management
- Traceable dispatch schedule, improving on-grid controllability

DC Bus Solution



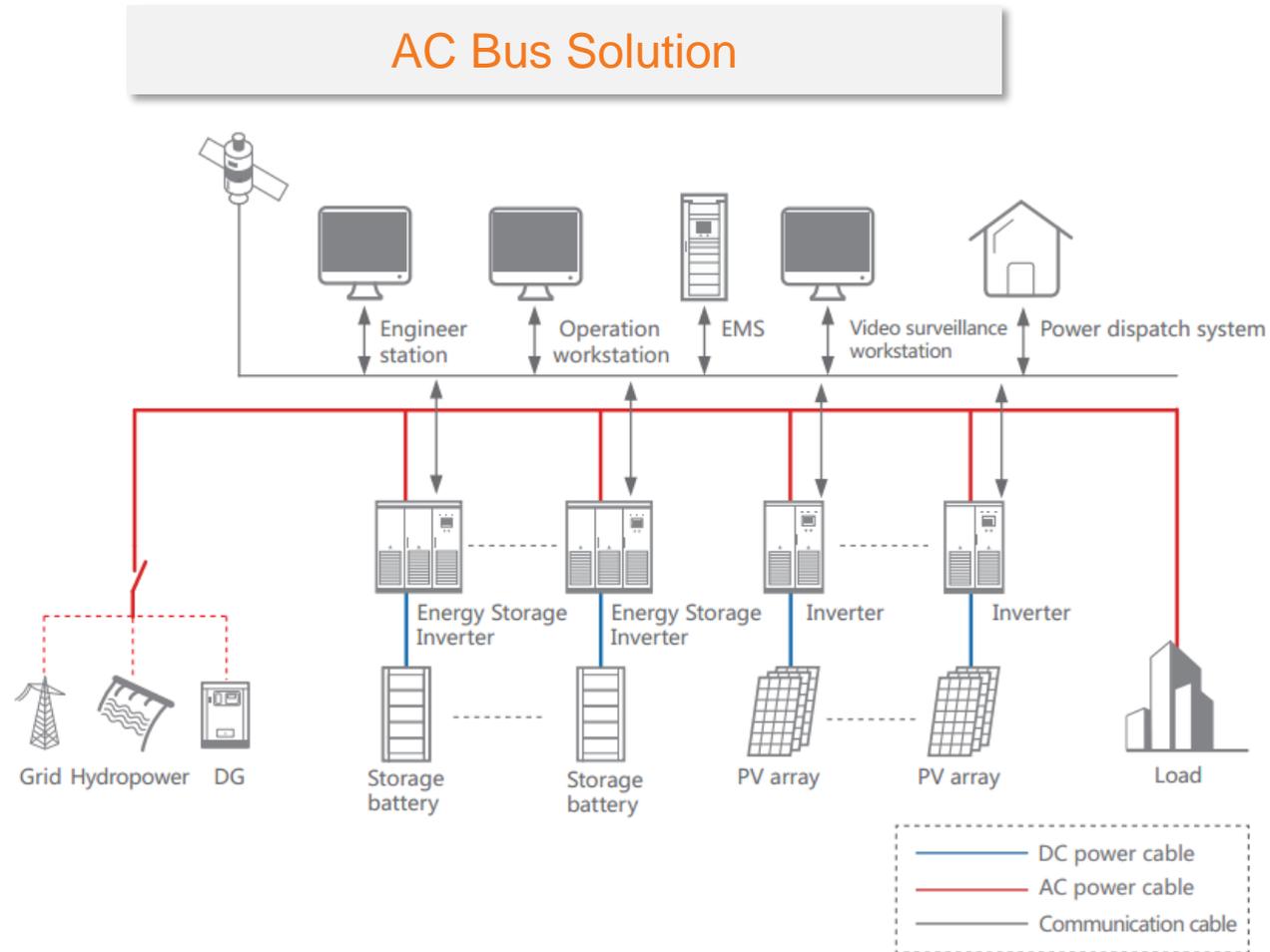
Applications

- Centralized solar power plant
- Centralized inverter system

Features

- DC bus, flexible configuration
- Convenient upgrade of solar power plant
- High efficiency, low ESS expense

System Solution/ Micro-grid

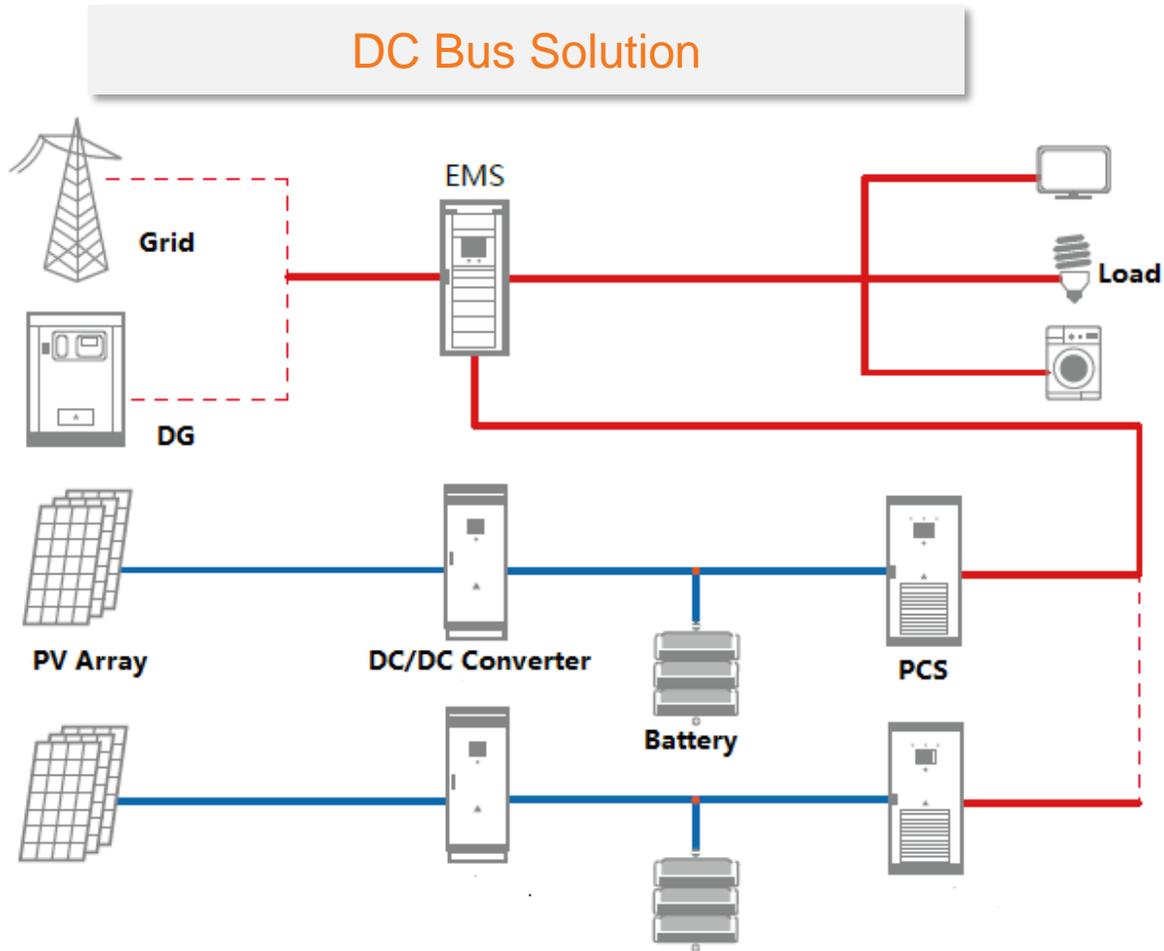


Applications

- Large-scale micro-grid in remote area without electricity
- Multiple power source, on-grid/off-grid mode
- MW level micro-grid

Features

- AC bus, centralized management
- High efficiency, flexibility, easy to integrate different renewable power sources
- Avoid update of transmission network



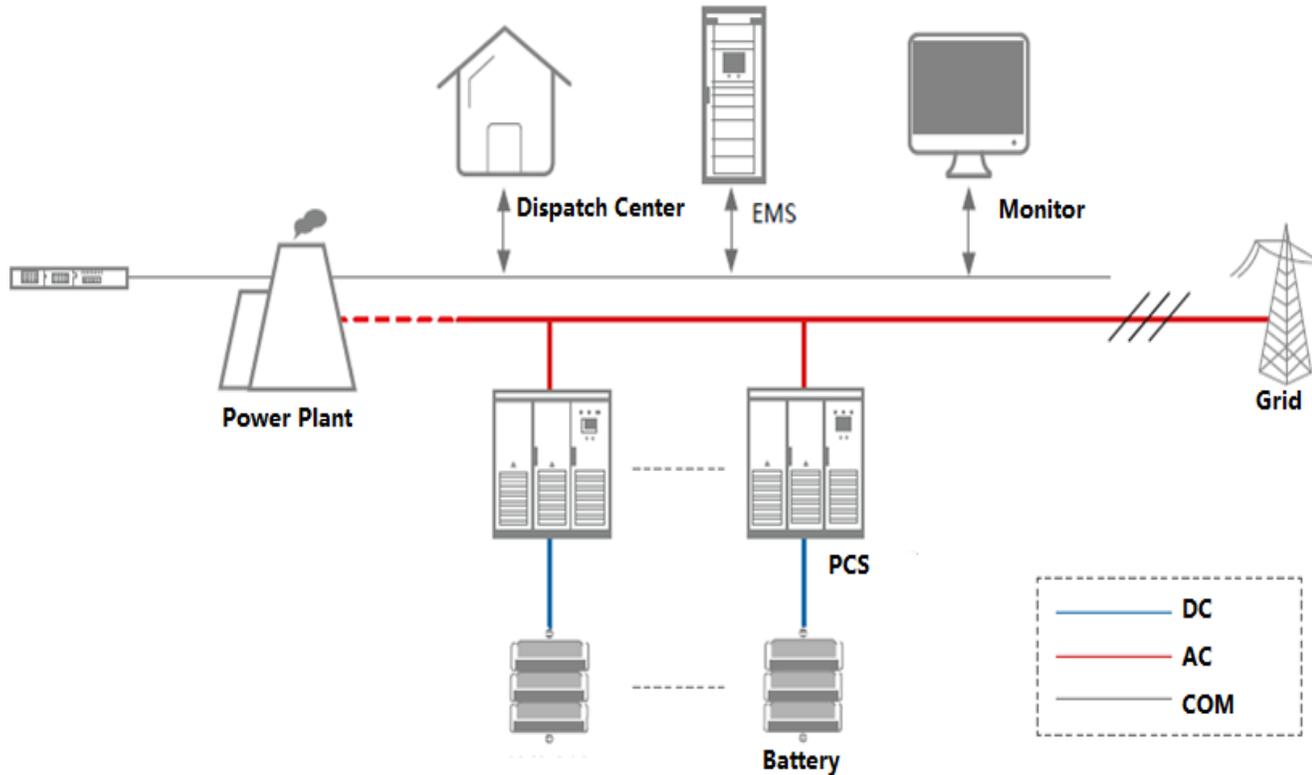
Applications

- Large-scale micro-grid in remote area without electricity
- Multiple power source, on-grid/off-grid mode
- MW level micro-grid

Features

- DC bus, flexible configuration
- Short switch time between on-grid/off-grid mode

System Solution/ Frequency regulation and peak load cutting



Applications

- Cooperate with generator for primary & secondary frequency regulation
- Cooperate with generator for peak load cutting

Features

- Precise detection of frequency deviation
- Response time in ms, fast and precise response to AGC dispatch orders
- Improve grid frequency & voltage stability

03

Products &
Service

Technology accumulation of solar power in the field of energy storage



**22-year power electronic
conversion technology**



3kW to 5MW energy storage
converter and inverter equipment
globally shipped= 87GW



**4-year energy storage
lithium battery technology**



0.5C to 4C multiplier battery full coverage
annual capacity 5GWh



**800+ energy storage
applications**

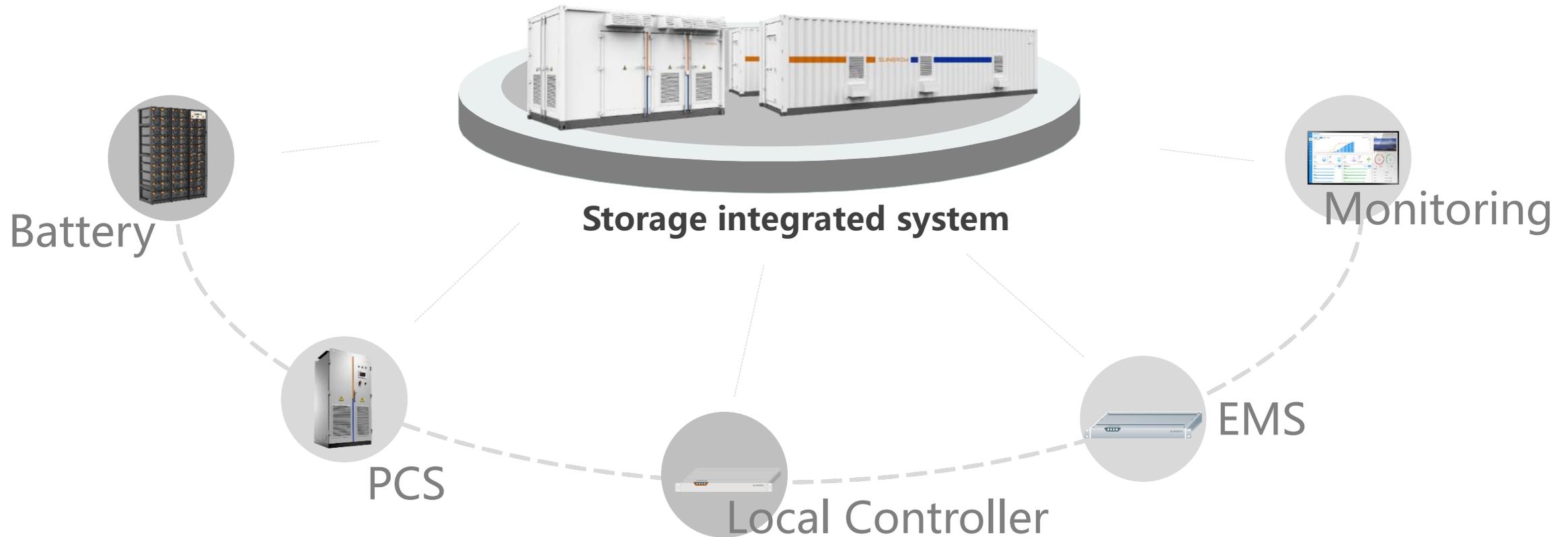


FM, microgrid, auxiliary new energy...
6GW/6GWh annual capacity

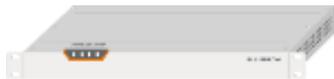
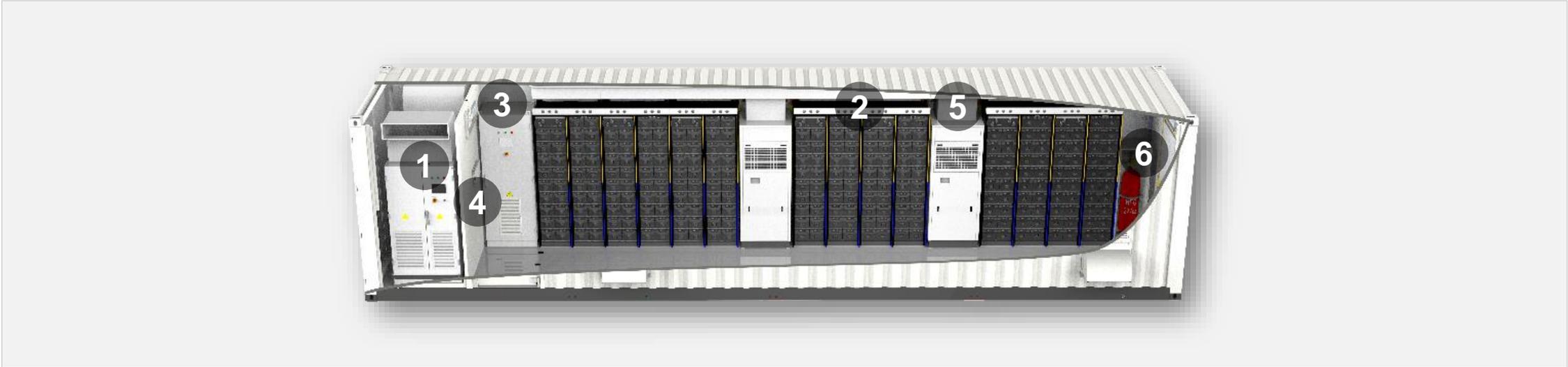


Sunshine power storage system business scope

- Provides energy storage converters, energy management systems, lithium batteries, monitoring and energy storage system solutions



An integrated energy storage integration system



- 1 PCS
- 2 Battery Bank
- 3 Cabinet(BCP)
- 4 Local controller
- 5 HVAC
- 6 FSS

注：ST2276KWH(L)-1000为例

Technical features of PCS



**Multiple
Parallels**

H/LVRT

SVG

**Efficiency
99%**

VSG

Fast Dispatch

ON/OFF Grid

Technical features of lithium battery storage



Cell

6000 cycles
High energy density
High standard test
High consistency



Module

High-precision, automated assembly;
Paralleled duct design;
Miniaturization, unitization, high-precision data sampling



Cluster

Support 1500V system
Multi-layer insulation design
Electrical & communication loop design



ESS

Four-level management technology, Intelligent temperature control system, Intelligent fire protection system, multiple protection, protection



04

Case Reference

Case Reference

More than 600+ projects and more than 2.7+GWh storage installation globally



Case Reference

PV(13MW)/battery(7MW/23.5MWh)/diesel microgrid project in Shuanghu of Tibet



PV/battery/diesel microgrid system with large-scale capacity, the highest altitude, severe environment

- Average altitude of 5000m
- Precise control of electricity quality under high penetration of renewable energy
- Excellent energy management system of large-scale battery storage system
- Multi-inverter parallel connection, compatible with rotary generators

100MW PV power station in Jinchang of China

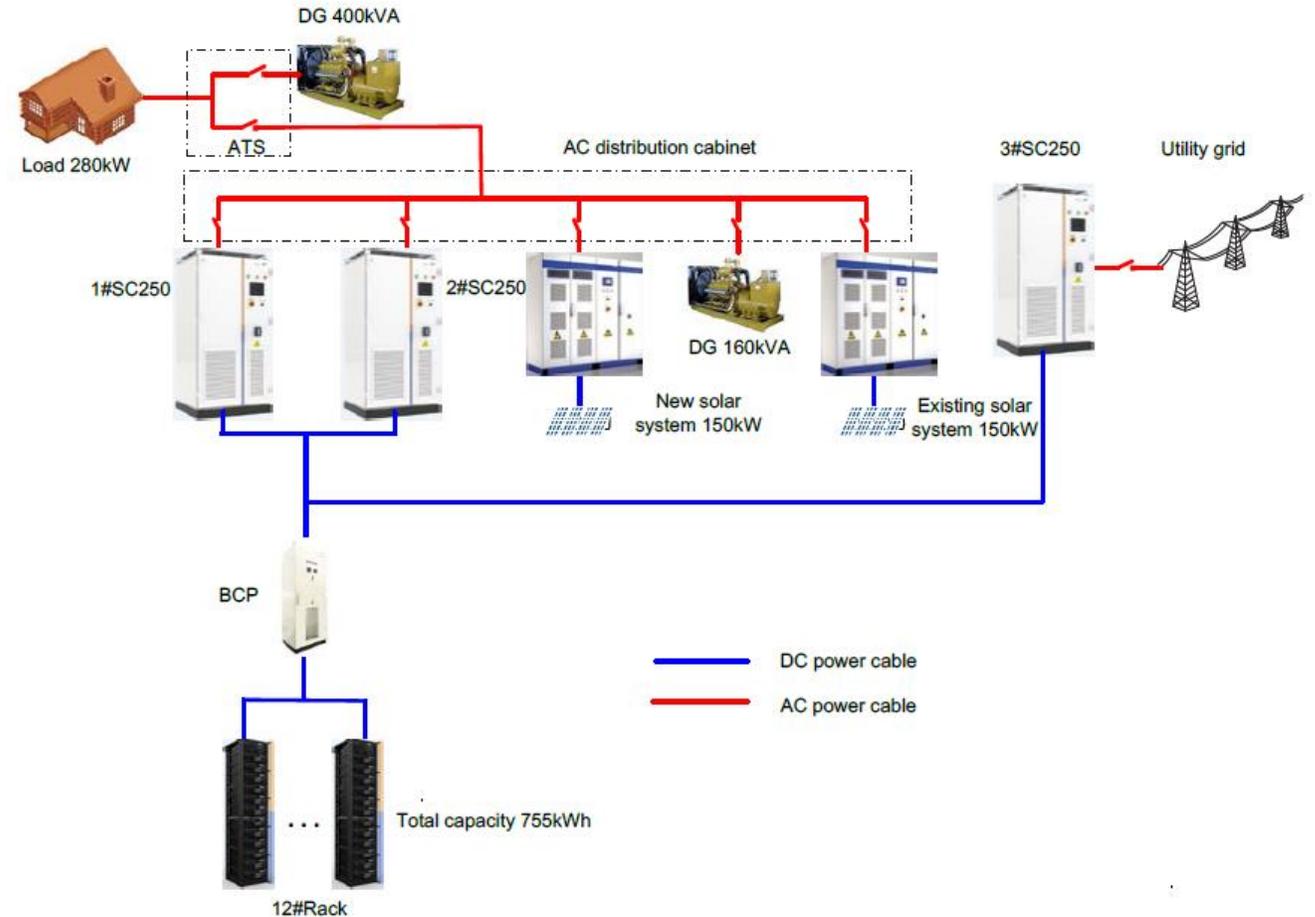


The first DC coupled battery storage system to solve the PV curtailment

- Reduce PV curtailment (40% PV curtailment rate in 2015)
- DC coupled battery storage system
- Good economic returns

Case Reference

PV/diesel/battery micro-grid system —Australia India Ocean Rock Lobster project



- Implementation time: March, 2018
- Project location: **Perth, Australia**
- System scheme: **AC bus solution**
- Project Size: 350kWp PV & 500kW/1.1MWh
- The project site is located in the lobster breeding base in Perth, western Australia. The system is used for the behind-the-meters of the user side, reducing the cost of diesel power generation, green cleaning and bill saving.

Case Reference

3MW storage project in Yangshan harbour of Shanghai



The largest frequency regulation project with super capacitor

- Improve power quality
- Primary frequency regulation
- Reduce the risk of electric shock
- Avoid reconstruction of regional power grid

1.5MW/2.7MWh microgrid system in Kampuchea



The first "Green Factory" project in Southeast Asia

- Green power instead of conventional diesel generator
- Improve power quality and save electricity cost
- DC coupled system, seamless handover, UPS
- Reduce carbon tax

Case Reference



PV(9MW)/battery(9MW/30MWh)/diesel microgrid project in Nima of Tibet



CGN 3 MW microgrid project in Qilian of Qinghai



Demonstration project of microgrid power station in Cuoqin of Tibet



PV/battery power station of GDSOLAR in Dunhuang Gansu

Case Reference



Diesel/PV/battery hybrid microgrid system in South Sudan



National demonstration project of wind/PV/battery microgrid system



PV(468kW)/battery(1MW/7.2MWh) microgrid system in Tibet



PV-battery off-grid power station in Yongxing island of Sansha

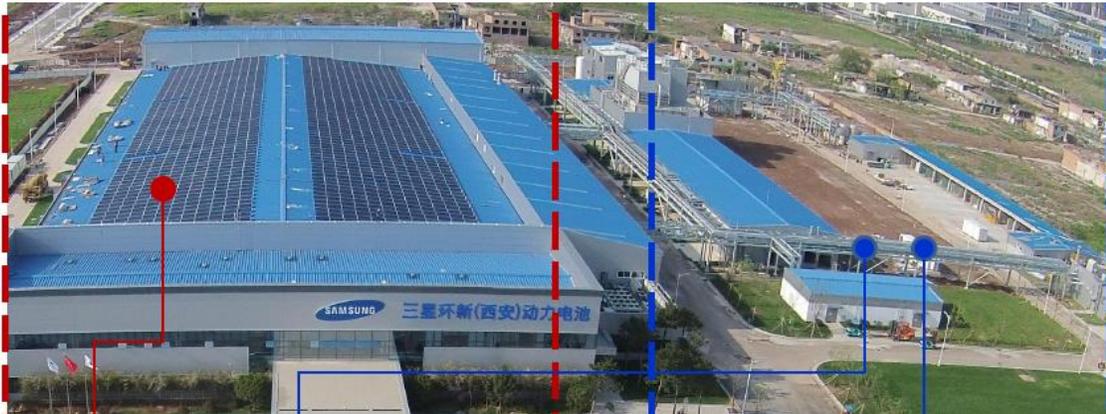
Case Reference



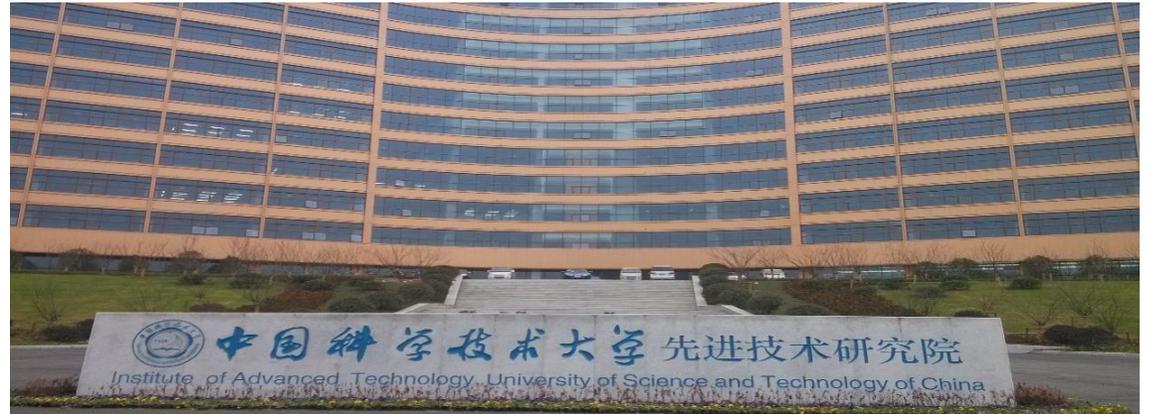
Microgrid power station in China Energy Conservation and Environmental Protection Group of Duozhi Qinghai



Hybrid system of wind/PV/battery/diesel/hydro generations in chengshan island



Load-shifting project at Samsung SDI (Xi'an)



500kW/2.16MWh battery energy storage system in USTC

